CHAPTER 3

BACKGROUND OF THE STUDY:
Bangalore Metropolitan Area
CHAPTER – 3

3. BACKGROUND OF THE STUDY: BANGALORE METROPOLITAN AREA

3.1 History, Growth and Development of Bangalore

Bangalore, the capital of Karnataka, has a history of over 400 years. The mention of Bangalore in different forms in the centuries old inscriptions testify to the antiquity of the city. Bangalore seems to have been an inhabited area from the First Century A.D. Roman coins have been found in Yeshwanthapur and the present Hindustan Aeronautics Limited area. The Bangalore area was ruled by the Gangas for six centuries till the Tenth Century A.D. and later it came under the Cholas. The name “Bengalooru” occurs in a Ninth Century A.D. inscription in the Nageshwara Temple in Begur, a village in the eastern part of present Bangalore. The origin of Bangalore city can be traced back to 1537 when it was founded by Late Shri Magadi Kempegowda (see Fig. 3.1). Kempegowda I, the ruler of Yelahanka, feudatory of the Vijayanagar rulers, built a mud fort around Bangalore in 1537 A.D. Kempegowda was a great builder of tanks and temples. Around 1637 Bangalore was conquered by the Bijapur Sultans; and Shahaji Bhonsle, father of Shivaji, was given Bangalore, along with a few other towns in Karnataka, as jagir. Shivaji spent about eight months in Karnataka, from April to December 1676, claiming his share of the paternal jagir from his step-brother, Venkoji. It is very likely Shivaji spent at least a part of that time in Bangalore. After fifty years of Bijapur rule, Bangalore was captured by the Mughals who held it for three years. Then the town came under Chikkadevaraja Wodeyar of Mysore (1673-1704) who built a second fort to the south of the one built by Kempegowda I. The latter fort is no longer there but a very small part of it remains, the Ulsoor Gate, some distance from the police station bearing the same name. It was Kempegowda II (1578-1658) who built the four watch-towers, at cardinal points making, according to folklore, the boundaries of the city. As of today, the city’s boundaries have gone far beyond the watch-towers (Resource Communications (Ed). 1994, p. 13). The eastern portion of the city was however developed by the British early in the 19th Century. The history of Bangalore is a tale of two cities which coalesced to form the present city.
when the British rule came to an end. By 1890, the population of the Cantonment area had crossed the 100,000 mark while that of the old city, which also had a prosperous
period of trade and commerce, had increased to over 80,000. The cantonment and the civil areas around it were, however, directly administered by the British Government and the city administration was with the State Government of Mysore. It was only in the middle of 1946, the civil areas were ceded to the State and in the year 1949, the city and civil areas of Bangalore were brought under one authority, the Corporation of the city with a population of over 7,00,000.

Perhaps, the most spectacular growth of the city started after independence of the country. The re-organization of states on linguistic basis in 1956 gave further impetus to the growth of Bangalore when it became the capital of a larger state of Mysore with the addition of vast Kannada speaking areas of the former Bombay, Hyderabad, Madras States and Kodagu. Bangalore developed not only as a headquarters of administration and an educational center of Karnataka but also had a tremendous growth as a prominent industrial center in the country. Presently, it is the Silicon Valley of India.

3.2 GEOGRAPHICAL SETTING
3.2.1 LOCATION OF BANGALORE

Bangalore is located at the Centre of the South Indian Peninsula, equidistant from both the eastern and the western coasts with an elevation of about 931 meters above the mean sea level (latitude 12° 58 North and longitude 73° 36 East) and is well known for its equable and salubrious climate.

3.2.2 TOPOGRAPHICAL FEATURES

Topographically, the city has slopes towards east and west with a smooth ridge running north to south. Rainfall over the ridge area gets divided and flows east or west (see Fig. 3.2). Water flowing down the eastern flank of the ridge ultimately joins south Pinakini, and likewise in the west the water follows the path of Arkavathi. The ‘residency’ area of Bangalore at an elevation of 900 meters above sea level forms one of the highest parts of the plain (maidan) region of Karnataka. Due to this kind of topography, all the waters received through rain tend to flow away. Since ages, part of the flow has been seeping into the ground to remain stored in the gaps in the weathered rock formations covered by a thin soil surface and also in the fracture of hard rock at deeper levels.
The predominant type of rock here is a light to dark-gray or whitish biotite granitic gneiss which varies in texture, structure and appearance from place to place. The darker minerals are generally arranged with a simple parallel orientation. The thickness of the weathered formation varies from place to place, depending on the topography and formation. Hard rocks have fractures normally to a depth of 60 meters (Lingaraju, The Hindu, 15th April 1982, p.4).

A review of the available bore-well data reveals that the zone covering the area parallel to the Chord Road, that is, Shivanahalli and Vijayanagara has thin soil cover and rugged topography. In addition to this, a series of surface tanks is found from north to south.

The site has unique topographical features, which have contributed, in creating various types of open spaces. The decision by ancient rulers to develop this area into a
picturesque garden can be justified. The Kempe Gowda tower is built on a granite outcrop of approximately 12m height and situated on the northeastern part of the park (see Plate 3.1). This archeological structure built by Kempe Gowda I, was to mark the extent of Bangalore’s growth. This hill is a favorite spot for many of the park users and acts as a focal point for the park.

When it comes to the surface drainage, there are nearly 50 tanks, both small and large, within or just outside the city of Bangalore. Important tanks are Kengeri, Kempambudi, Sankey, Siddaguntanapalya, Yediyur, Belandur, Byrasandra, Challaghatta and Lalbagh tank (see Fig. 3.3).

At present, some are purely ornamental, but most of them are irrigational tanks with varying degrees of wet cultivation. In the past, most of these tanks were getting filled with rainwater only and tended to dry up considerably during the non-monsoon seasons. But the enormous quantity of wastewater from the city now keeps these tanks perennially full. The tanks within and around the city have now become prolific sources of Culex mosquitoes because they are contaminated by sewage. Almost every tank gets some amount of sewage which is carried during the rainy season from the city. It is also to be noted that with the phenomenal increase in population and the development of new suburbs, many tanks which at one time were away from the urban influence, have now become part of the garbage and sewage disposal system. This has greatly added to their mosquito breeding potential and ground water pollution.

**Nullahs and Sewage** – Though the major part of the city has underground sewers, there are many sections without this which are private layouts, including large industrialized areas around but very close to the city. In such areas, the entire sewage flows into the natural drainage channels (see Plate 3.2, 3.3 & 3.4) which are neither lined nor properly
drained. Moreover, the main sewers have been laid up to and beyond the urban limits only in three of the six major valleys, namely, Chellaghatta, Koramangala and Vrishabavati. The other valleys namely, Hebbal, Kathriguppa and Tavarekere (Madivala) valleys are yet to be covered. There are also a few other minor valleys such as the Arkavati Valley in the west which still need main sewer lines. The entire sewage of these valleys get into Kutcha nullahs. In the Hebbal Valley, however, a large stone lined box shaped drain has been built near Gangenahally. Most of the slum dwellers and industries are throwing waste into these open nullahs and they are highly polluted.
Storm water drains, large and small, are found in all parts of the city and many of them also carry wastewater from domestic as well as public taps. While they were built to drain the rush of rainwater they are inefficient to remove the trickles of wastewater from houses. The gradient in many cases is not enough for smooth flow of water, nor to flush away the debris. This is made worse by the indiscriminate dumping of rubbish in to the drains and the natural accumulation of silt. Water stagnates in many of these drains, and is a common roadside sight.

### 3.2.3 CLIMATIC FACTORS

Bangalore is well known for its equable and salubrious climate and has often been referred to as the ‘air-conditioned’ city of South India. According to Koppen’s broad climate classification, the climate of Bangalore can be described as the tropical monsoon type.

The main features of the climate of Bangalore are an agreeable range of temperature, from 33°C in April to 14°C in January, and the two rainy seasons June to September and October to November, coming one after the other but with opposite wind regimes, corresponding to the southwest and northeast monsoons respectively. The marked thunderstorm activity with occasional hailstorms and squalls in April – May and September – October are also typical. Of the annual rainfall of 844 mm, a little more than
half occurs during the southwest monsoon period and about a quarter in the northeast monsoon period. Appreciable rainfall also occurs in April – May. Two other important features are the predominant low clouding and the more or less steady temperatures with small diurnal variation during the whole monsoon season, June to October, and the early morning dew and mist or fog during the months of October – February.

a. TEMPERATURE – According to a study by Mani, December is the coldest month in Bangalore with a mean temperature of 20°C, but January has the lowest daily minimum of 14°C and the mean monthly lowest temperature of 11°C (Mani, A, 1984, p.5). The last week of December and the first week of January are the coldest periods of the year. The highest temperature recorded in 80 years was 38.9°C in May 1931 and the lowest temperature recorded was 7.8°C in January 1884.

The annual range of the monthly mean temperature is only about 7°C. The annual range of the mean daily maximum temperature is 8°C and of the mean daily minimum temperature is 6.5°C. The mean of the extreme annual range of temperature that is, of the difference between the highest and the lowest temperature recorded in a year is about 25°C. This range varies between 22°C and 27°C, in individual years.

It will be seen that the warmest days occur in the last week of April and the coldest in the first or the second week of January. The highest daily maximum temperature occurs in the first two weeks of April, while the highest daily minimum temperature occurs towards the end of April and the beginning of May.

There is a slight rise of temperature from the middle of September to the beginning of October, in the transition period between the Southwest and Northeast monsoon seasons. From the end of October, there is a fairly rapid fall of temperature till the middle of January.

b. HUMIDITY – In Bangalore, the highest mean relative humidity of 75 percent occurs during July to October and the lowest mean relative humidity of 46 percent in March. There is a rapid fall in the relative humidity from December to March, the decrease being most rapid between January and February. There is a sharp rise between March and June, the increase being most rapid between May and June. Relative humidity has a fairly large
diurnal range. The maximum relative humidity during the day occurs at about 6 a.m. and the minimum at about 3 p.m. The diurnal range is highest, 40 percent from February to April when the air is dry, and lowest from July to October at 24 to 25 percent, when the air is moist. The lowest relative humidity in the year of 28 percent occurs between 3 and 4 p.m. in March and the highest (87 percent) at about 6 a.m. during August to October.

c. RAINFALL – Bangalore receives 54 per cent of the total annual rainfall in the Southwest monsoon season (June to September) with a rainfall of 449 mm and 32 rainy days. The rainfall increases from June to September (with the maximum rainfall occurring during September and October), with July and August being the rainiest months. The Southwest monsoon rain commences in the first week of June and closes at the end of September. In April-May, which is a period of summer thunderstorms, the mean rainfall is 145 mm and the number of rainy days is 9. December to March is a comparatively rainless period with a mean rainfall of 33.8 mm and about 3 rainy days.

The major part of the rainfall and a large percentage of heavy falls, especially during April – June and September – October, is associated with thunderstorms. The intensity of rain is greater in April – May and September – October than in the other months of the year and is the greatest in September. The heaviest rainfall of 163 mm in 24 hours occurred on 27th August 1890. This is the highest rainfall recorded in a stretch of 70 years from 1881 up to 1950.

d. WINDS – The surface winds over Bangalore have a fairly clear – cut seasonal character with easterly components predominating in one period and westerly components in the other. During the period May to September, the winds are WSW to W, while during the period November to March they are ENE to ESE. April and October are the transition months when the change over from easterly to the westerly wind region and vice versa takes place.

Occasionally, squalls associated with thunderstorms and rain occurs, mainly in April – May and September – October. The highest wind speed recorded so far is 106 km/h, at about 3.20 p.m. in a squall from the NE on 3rd May 1950. Two other severe squalls occurred on 10th May 1948 and 26th May 1947, when the highest wind speed reached were 102 and 99 km/h respectively.
e. WEATHER PHENOMENA – The most important weather phenomena affecting the climate of Bangalore are the thunderstorms and associated squalls and the early morning mist or fog. The primary thunderstorm maximum occurs in April – May and the secondary maximum occurs in September – October. The two minima are in July – August and December – February. Generally, there are as many as 46 thunderstorms in a year. The month of May experiences the largest number (about 13) with April coming next (about 9), and September and October, each have about 5. Thunderstorms occur generally between 4 and 9 p.m. The highest frequency being at about 8 P. M. They are associated with moderate to heavy showers, but short – lived and sometimes with hail.

It is observed in recent times that the climate of Bangalore has changed and there was a general opinion that Bangalore no more enjoys its salubrious character of garden city. It is necessary to improve the climate of Bangalore by controlling the encroachment in the green belt and also by preventing the shifting of green belt as far as possible. Open spaces have the potential to act as green wedges adding to the effectiveness of green belt support to the city.

3.3 POPULATION GROWTH

The population of the Bangalore Metropolitan Area was 5.69 million, according to the 2001 Census, as against 4.13 million in the 1991 census. As per the 2001 Census, Bangalore ranks 5th among the largest metropolitan cities in India, a high jump in the rank from the 6th place in the previous decade. Now it is estimated that the population of the Bangalore Metropolitan Area is around 7 million and by the year 2011 it will be 9 million (see Table 3.1). The ever-increasing population would add to the problems of the already strained infrastructure facilities associated with environmental decay and decline in the quality of life in the city. Adding to this is the strain consequent to the ever increasing 1.5 to 2.0 million floating population in the city.
Table 3.1 Growth of Population in Bangalore Metropolitan Area.

<table>
<thead>
<tr>
<th>Census Year</th>
<th>Population in Million</th>
<th>% Increase</th>
<th>Area (Sq-Km)</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>0.22</td>
<td>-</td>
<td>144.78</td>
<td>-</td>
</tr>
<tr>
<td>1911</td>
<td>0.26</td>
<td>14.5</td>
<td>156.43</td>
<td>8.05</td>
</tr>
<tr>
<td>1921</td>
<td>0.31</td>
<td>19.2</td>
<td>160.94</td>
<td>2.88</td>
</tr>
<tr>
<td>1931</td>
<td>0.39</td>
<td>27.5</td>
<td>174.55</td>
<td>8.76</td>
</tr>
<tr>
<td>1941</td>
<td>0.51</td>
<td>28.9</td>
<td>181.24</td>
<td>3.84</td>
</tr>
<tr>
<td>1951</td>
<td>0.99</td>
<td>94.9</td>
<td>193.08</td>
<td>6.53</td>
</tr>
<tr>
<td>1961</td>
<td>1.20</td>
<td>21.4</td>
<td>255.62</td>
<td>32.39</td>
</tr>
<tr>
<td>1971</td>
<td>1.65</td>
<td>37.0</td>
<td>285.95</td>
<td>11.87</td>
</tr>
<tr>
<td>1981</td>
<td>2.91</td>
<td>76.72</td>
<td>366.39</td>
<td>28.13</td>
</tr>
<tr>
<td>2001</td>
<td>5.69</td>
<td>37.77</td>
<td>531.00</td>
<td>19.05</td>
</tr>
<tr>
<td>2011</td>
<td>7.83</td>
<td>37.68</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2021</td>
<td>10.88</td>
<td>37.68</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>


The above table reveals that Bangalore had a population of 0.5 million in 1941 and was the sixteenth largest city in the country. It attained the status of ‘million’ city in 1961. In the decade 1971–81, it recorded the highest rate of growth of population to become the fifth largest city in the country. It had taken 30 years for the population to increase by 1.25 million between 1941 and 1971, but it took only 10 years to register the same increase from 1971 to 1981. However, the population growth rate declined during 1981 to 1991. The City is expanding from city center towards BMA and is growing in all directions. Development is in an irregular radial pattern. The CDP for 2011 is proposed for an area of 1279 Sq.Km wherein area for development is 531 Sq.Km and green belt is 742 Sq.Km.

Bangalore population has been growing rapidly in the last two decades. Today, Bangalore has gained all-round importance as an administrative center, trading, and industrial center along with large IT & BT industries and also as a center of strategic importance due to a concentration of defense establishments. With the establishment of Indian Space Research Organization (ISRO) and several high technology electronics industries, it has become the seat for scientific and technological advancement. Naturally, Bangalore has become the focus of migration of population from rural areas and other centers, both within and outside the state. The share of immigrants from other countries into Bangalore has always been negligible. Since Bangalore is located in a corner of the state, most of the
migrants from Tamil Nadu and Andhra Pradesh must have come from adjacent districts across the inter-state border. Due to poverty, short distance mobility is a characteristic feature of migration into the city. The area of the city has also expanded enormously during the period 1901–2001 from 28.85 sq. km to 512 sq. km (see Image 3.1). The urban sprawl of Bangalore has taken place in almost all directions, as there are no natural barriers. The city has spread all around the pre-urban nucleus. This has enormously increased the cost and physical strain on essential services like power, water supply, sewage disposal, transport, law and order, besides stretching them to a breaking point.

The abnormal growth of the city with reference to both area and population has created problems of scarcity of essential physical and social infrastructure and has resulted in higher per capita cost for improvement and maintenance. Squeezing of population in the
congested area, emergence of high-rise buildings, indiscriminate destruction of greenery, haphazard and fast developing urban sprawl, disorderly and large-scale fringe development, are the problems remaining to be effectively tackled. Pressure on land which has become scarce, has given rise to numerous problems of housing, traffic, transportation, slum and municipal waste management. Ever since the factories were established and commercial activities developed, the slums too have come into existence. Day by day the number of slums is on the increase by leaps and bounds. According to reliable estimates there were 230 slums in Bangalore in 1975, 401 in 1989 and 545 in 1992; but there are over 778 of them in 2005. It is estimated that in 1981, 10.5 percent of Bangalore’s population were slum-dwellers. As per Gowda and Sridhara’s estimates presently 27 percent of the Bangalore population are slum and squatter settlement dwellers. It cannot be denied that considerable efforts are being made on a large scale to provide shelter to the urban poor. Inspite of this the number of pavement dwellers, slums and squatter settlements are increasing every day (Gowda, K. & Sridhara, M. V. 2000, p.12).

The population size, growth rate and distribution have contributed significantly to shaping the environment of the city. The impact of population on environment is primarily through the use of natural resources and production of wastes, all caused by increased economic development and its spread. The major form of environmental stress in the city is loss of biological endowments and their diversity and water and air pollution and waste generation. The major environmental problems arising from the process of urban development are increasing pollution levels due to discharge of residential wastes, i.e. gaseous, liquid and solid wastes, into the environment and destruction of the fragile urban ecosystem.

3.4 LAND USE PATTERN

The term ‘land use’ is generally adapted to mean man’s activities which are directly related to the land. Land use can be defined as activity or development which occupies land. It could also be called ‘human use of land’ or ‘human activities on land’ which means that this idea deals as much with people as with land. All non-forest land can be treated as land subject to ‘land use’.
Land is a basic resource in urban planning. Primarily, land use must be correlated to the dominant functions which a city must perform. The strategy should be to encourage functions which promote the economic efficiency and, at the same time address the issues related to the management of urban environment in all its aspects. It is necessary to formulate rational and long-term land use planning objectives. The objectives of land use planning may in brief be summarized as: improving physical environment, strengthening urban economy, conserving ecological equilibrium and fostering social values. Broadening our approach from the particular to the general, the following may be stated to be the essential objectives:

- Establishing a harmonious relationship between areas to be devoted to residential, commercial, industrial, institutional, recreational green and other purposes
- Providing for a planned and orderly development of an urban area for the present and the foreseeable future
- Satisfying diverse needs of the community without provoking conflicts;
- Promoting urban and regional economies
- Helping the inhabitants of the city develop social cohesiveness and a sense of belonging to the community
- Minimizing misuse, preventing abuse, regulating disuse and guiding reuse of land.

The above objectives come under, what is broadly called ‘Sustainable Development’. In the case of Bangalore, land use planning should be designed with due regard to the following economic roles which the city performs: administration, trade and commerce, housing, industry, center for science and technology as well as for research and higher learning, economic and financial services, provision of social services – including proper waste disposal and the tertiary sectors. Due to insufficient housing facilities many unorganized residential colonies have come up in addition to slums. The density of population is very high in the core area which reduces gradually towards the peripheral areas (see Image 3.2).
Bangalore is provided with a radial network of roads and major industries are located along these roads. As a result, all along the roads both residential and commercial developments have taken place at a faster rate in a haphazard manner. To have a check on this unplanned growth of the city, an Outline Development Plan (ODP) was prepared and approved by the Government in 1972. Further the ODP was replaced by Comprehensive Development Plan (CDP) approved by the Government in 1984. Before taking up the revision of CDP a detailed land use survey for the Bangalore Local Planning Area (LPA) was carried out in the year 1990. The details of the land use are indicated in the Table 3.2. It is observed that the different land uses are indicated. The village settlements and other areas are scattered in the LPA. Spatial expansion of the city produces an impact on the environment by causing loss of agricultural land and increasing the built up area.

The identification of land required for development based on appropriate density and distribution criteria in different areas for different purposes are indicated for the year 2001 A.D. The total demand of land for different urban uses for a population of 7 million by 2001 is at about 56,465 hectares to satisfy the effective demand of land for shelter and other purposes (see Table 3.2).
Table 3.2 Land Use for Bangalore Metropolitan Area – 2001 A.D.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Land Use</th>
<th>Area in Hectare</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residential</td>
<td>24369.21</td>
<td>43.16</td>
</tr>
<tr>
<td>2</td>
<td>Commercial</td>
<td>1643.68</td>
<td>2.91</td>
</tr>
<tr>
<td>3</td>
<td>Industrial</td>
<td>3844.07</td>
<td>6.81</td>
</tr>
<tr>
<td>4</td>
<td>Public &amp; Semi-Public</td>
<td>4908.91</td>
<td>8.69</td>
</tr>
<tr>
<td>5</td>
<td>Parks and Open Spaces</td>
<td>7788.15</td>
<td>13.79</td>
</tr>
<tr>
<td>6</td>
<td>Transportation</td>
<td>11697.04</td>
<td>20.72</td>
</tr>
<tr>
<td>7</td>
<td>Un-classified</td>
<td>2213.94</td>
<td>3.92</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>56465.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>


Based on this table, due care has been exercised to maintain ‘work-home’ relationship while proposing areas for residential developments. Green belt covers 682 sq. kms of the LPA and is proposed with a view to provide better climatic conditions. Steps are necessary to be taken by all the Departments and Agencies concerned to prevent encroachment of land in the Green Belt (see Fig. 3.4). Large scale tree planting, provision of recreational facilities and other public and semi-public uses have to be proposed in the Green Belt. In addition, arrangements have to be made to monitor and increase green activities in the green belt areas.

3.5 ZONING OF LAND USE AND REGULATIONS

In order to promote health, safety and the general social welfare of the community, it is necessary to enforce reasonable limitations on the use of land for buildings. This is to ensure that the most appropriate economical and healthy development of the city takes place in accordance with the land use plan. For this purpose, the City is divided into a number of use Zones, such as residential, commercial, industrial, public and semi-public, etc. Each zone has its own regulations as the same set of regulations cannot be applied to the entire city.

Zoning protects residential areas from the harmful invasions of commercial and industrial uses and at the same time promotes the orderly development of industrial and commercial areas. By regulating the spacing of buildings, adequate light, air, protection from fire, etc., can be provided. It prevents over crowding in buildings and land and thus ensures adequate facilities and services.

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Fig.3.4 Existing Land Use in Bangalore Metropolitan Area

Zoning is not retrospective. It does not prohibit the uses of land and buildings that are lawfully established prior to the coming into effect of the zoning regulations. If these uses are contrary to the newly proposed uses, they are termed as non-conforming uses and are gradually eliminated over years without inflicting unreasonable hardship upon the property owner.

The Zoning regulations and their enforcement are a major tool in adhering to the land use pattern of the Master Plan. This has to be closely linked with any plans to translocate city activities.

3.5.1 Parks, Open Spaces and Playgrounds (including Public Recreational Area)

Uses that are permissible under special circumstances by the Authority: open air theaters, indoor recreational uses, dwelling for watch and ward, social clubs, canteens, libraries,
Government dispensaries, milk booths, HOPCOMS and public use ancillary to park and open spaces, the area of such ancillary use not exceeding 5 percent of the total area (See Figure 3.5).

Fig. 3.5 Parks and Gardens in Bangalore Metropolitan Area

3.5.2 Agricultural Zone (Green Belt)

(a) Uses that are permissible: Agriculture, horticulture, dairy and poultry, farming, milk chilling centres, farm houses and their accessory building and uses not exceeding 200 sq. mts. of plinth area within the plot area limitation of 1.20 hectare. Uses specifically shown

Source: Stanley, E. (1999), “Parks and Gardens”, City Gritty - The Times of India, Bangalore, p.6. (Compiled by the Author)
as stated in the land use plan like: urban village, brick kilns, quarrying and removal of
clay and stone up to 3 mts. depth, gardens, orchards, nurseries and other stable crops,
grazing pastures, forest lands, marshy land, barren land and water sheet, Highway
amenities viz., Filling stations, Weigh Bridges and Check posts.

(b) Uses that are permissible under Special circumstances by the Authority: Places of
worship, schools, hospitals, libraries, sports, clubs, cultural buildings, exhibition centres,
park and open spaces, storage and sale of farm products, where it is produced, the service
and repairs of farm machinery and agricultural supplies, residential developments within
the area reserved for natural expansion of villages and buildings in such areas should not
exceed two floors (Ground one).

3.6 BANGALORE TODAY: Its Prominence and Problems

The City of Bangalore is considered as one of the finest cities of India and some
comparative studies conducted by Vastu-Shilpa Foundation has revealed that the City
ranks very high across the cities in India in several important aspects of better quality of
life such as climate, recreation, entertainment, social infrastructure, people’s attitudes, rail
and air links, potentiality for growth, career prospects, housing availability and its quality,
health, law and order, etc. Bangalore is unusual among Indian cities in the sense that it is
a locus for both hi-tech industries and advanced research in science and technology. On
account of its strategic location and commercial potentiality, the Government of India has
located major industries such as the Indian Telephone Industries, Hindustan Aeronautics
Limited, Hindustan Machine Tools, Bharath Electronics, etc., besides setting up research
organizations such as Indian Space Research Organization, National Aeronautical
Research Laboratory, Aeronautical Development Agency, Electronic and Radar
Development Establishment, Gas Turbine Research Institute, Power Research Institute,
Raman Research Institute, Indian Institute of Astrophysics, etc. The premier educational
institutions of India such as Indian Institute of Science, Indian Institute of Management
and National Law School are also located in the City of Bangalore. This happy mix of
industry and research is a factor behind its recent emergence as a world-class center for
computer software design, and also a magnet for foreign investment. “Some 1658
computer companies, most of them working on overseas software contracts, are located in
Bangalore, including a score of multinationals – IBM, Hewlett-Packard and Bell among them. Some have joined forces with Indian hi-tech companies such as Wipro and Tata Information Systems”. Further “more than 300 thousand computer specialists work in Bangalore and the city is the heart of a software export industry that has more than doubled its services in the past two years, topping $6.27 billions” (STPI, Dept. of IT&BT, 2006). The City is globally known as Silicon Valley of Asia apart from being acclaimed as the Garden City of India. In recognition of its growing importance many multinational companies, especially in the field of software development, information technology, biotechnology, etc., have established their corporate offices at Bangalore. Many multinational companies have also been setting up their Asian Offices or Indian Headquarters Offices in Bangalore.

On the other hand, the present population of Bangalore is more than 7 million but it is difficult to predict the size of the city, particularly in view of the huge floating population. The only hopeful sign is that Bangalore’s growth did slow down in the decade 1981-91 as compared with the previous decades, but old Bangaloreans do not see any reason for optimism about their city. In the last twenty years or so it has expanded at a dizzy pace in every direction, and old landmarks have disappeared, coconut groves, vineyards, guava and mango orchards, being cut down to form mean layouts with even meaner streets. Tanks which were essential for maintaining the water table, growing food crops, vegetables and orchards, and attracting bird life, have been drained out for locating bus stations, playgrounds and residential colonies.

The pace of development has been such that municipal services are in danger of breaking down. While the government is making greater and greater efforts to pump water into the city from the Kaveri and other rivers, there is a limit to its ability to maintain supplies to every nook and corner of the fast-growing metropolis. Summer is the time when the resources of the Bangalore Water Supply and Sewerage Board are strained to the utmost, for power breakdowns and voltage fluctuations make the task of pumping water from the reservoirs to all parts of the city most difficult. The Karnataka Electricity Board has become a by-word for inefficiency. Garbage collection is irregular, piles of stinking garbage adorning street corners, being a common sight. Bangalore once used to be referred to as “pensioners’ paradise”, “air-conditioned city”, “garden city” and so on is now a virtual rubble and a civic disaster.
The number of vehicles in Bangalore has increased to more than 1.75 million and Bangalore is reputed to have the largest number of two-wheelers in the country. During peak hours, the city roads are clogged with a bewildering variety of vehicles. These vehicles are emitting black, poisonous fumes onto the roads. Pollution has increased visibly during the last twenty years, and the recent decision of the police chief to provide masks for all traffic policemen in the city, is a sound, if ominous, one. In fact, it is desirable that all those living in Bangalore wear masks to protect themselves from pollution especially as Bangalore is known to be unfriendly to asthmatics.

Pedestrians are denied even the use of pavements where such exist. Paving pavements with granite slabs is common in Bangalore but it is hazardous to walk on pavements when, thanks to lack of maintenance, slabs jut out at all angles, becoming really stumbling-blocks to the unwary. Builders use pavements for dumping all kinds of building material from sand to jelly stones, and the materials lie there for months but no one seems to bother. Pavements also provide parking space, during working hours, for mobile eateries, cobbler's stands, cycle-repair shops, coconut sellers, fruit stalls and what have you. In many cases, respective shopkeepers encroached upon the pavements to expand their business space. Approximately 165 villages have been absorbed within the Corporation limits of Bangalore and another 218 villages come under the urban agglomeration including the Green Belt (Gowda, K. & Sridhara, M. V. 2000, p. 5).

Another serious problem of Bangalore and perhaps of other fast-growing cities as well, is the rapid shrinkage of lung space. Even areas set apart in the new layouts for schools, playgrounds (civic amenities) etc., are often diverted to other uses with the connivance of officials and politicians. A few stretches of open land still exist in Bangalore but it looks as though there does not seem to be any intention to preserve them as open space. Urban land sharks are eyeing them covetously. Most of the vacant lands have become dumping grounds for wastes, creating environmental problems for the surrounding people.

3.7 CIVIC AMENITIES/COMMUNITY FACILITIES

Planning strategies and design guidelines are important, but are much neglected. Land use requires a systematic approach for its management. The phenomenal growth of Bangalore
City in area as well as population has outpaced the programmer in respect of providing, managing and maintaining community facilities such as community halls, recreational and cultural centers, open spaces, parks, gardens, lakes and green areas. Community halls and religious centers are used for promotion of art and culture and also for public gatherings.

(a) **Community facilities:** A host of community facilities required by the city such as recreational facilities, community halls, cultural centers, etc., are all available in different parts of the city.

(b) **Recreational:** Bangalore is called the Garden City for having large parks and open spaces in addition to avenue trees in almost all parts of the city. Lalbagh and Cubbon parks are having facilities for children to play and learn. Another lung space in the city is the Palace Ground which is about 110 hectares (see Image 3.3).

![Image 3.3 Open Spaces – Part of Palace Ground and Raman Research Institute](image)


If it is effectively used, it will provide much needed lung space to the northern part of Bangalore. Race Course which is located in the city core area is proposed to be shifted and it also serves as another major open space in CDP area.
Bangalore has several stadiums for sports like cricket, football, hockey, tennis and athletics (see Plate 3.5 & 3.6).

(c) Community Halls and Religious Centre: Bangalore has many community halls and religious centers which are used for promotion of art and culture and also for public gathering such as Town Hall, Ravindra Kalkshetra, Chowdaiah Memorial Hall, Kala Manovilas, Corporation Community Halls, etc.

(d) Religious Centre: Ramakrishna Ashrama, ISKCON, Satya Sai Centre, Gayana Samaja, etc.

The unclassified area covers 2114.24 hectares or 7.45 percent of the developed area. There are vast areas of defense land within the city (see Image 3.4). In a way these defense areas which are sparsely developed act as lung space and also in some cases they act as barriers segregating the areas of either side of such large defense uses.
3.8 THE DEGRADATION OF NATURAL ECOSYSTEMS

The population of Bangalore during the last few decades has been growing at an alarming rate. The recent growth has changed the surrounding countryside. The agricultural lands in this area have been taken over by sprawling housing development. The city and its surrounding areas now face problems of traffic congestion, visual and environmental degradation due to commercial and residential growth. The city will need an innovative open space plan, which preserves the natural character and unique qualities of the place. Many other urban centres provoke similar concerns and needs. There have been parallel
developments in the field of landscape ecology and landscape planning for better understanding of our environment. The primary goal of this thesis is to use concepts from both these fields with intent to developing an approach which will help planners, landscape architects and developers to plan and design for open space upgradation in a way that meets long term ecological needs and concerns. This open space planning approach can in turn be used to guide other regions and counties in developing ecologically grounded open space plans. Spatial attributes, functions and the change dynamics of the landscape are targeted and analyzed to provide a foundation for an open space plan. Management priorities are then established for protecting, enhancing, and restoring agricultural lands, forestlands, wetlands, streams, and special sites (see Plate 3.7 & 3.8).

Land developers have moved into Bangalore, and there are scores of high-rise buildings coming up all over, both concrete and glass towers of commerce as well as residential apartment complexes. In many areas, few could resist the temptation of selling stately old bungalows with spacious gardens to developers at astronomical prices. These are the first casualties when land is taken over for building. Luckily, there are rules in place to check this: they cannot fell a tree without the go-ahead of the Forest Department. Before the Forest Department can issue permission for a tree to be felled, at least two saplings have to be planted first. Here, long lasting hard wood trees require priority.

There is an urgent need to update the rules of the Forest Department if Bangalore’s tree cover is to be protected. “A Forest Officer cannot save every tree when land is sold. And the legal system that governs the protection of trees gives a great deal of arbitrariness to the Tree Officer. There is absolutely no public consultation that is worth talking about. The Forest Department does not have the wherewithal to go and inspect every tree that is to be cut. So, in many cases, the default option is to give a go-ahead to cut a tree. This is a system that needs to be changed. It is a big challenge to protect trees when land is poached for development and trees are cut”.

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BDA, the main agency responsible for identifying and acquiring land that would be converted into sites, claims that every care is taken to see that new layouts have adequate green cover.

A brief account of evolution of Parks, Open spaces and Green areas in BMA with respect to other uses and development over the last five centuries has been presented in the following:

**Natural Structure:** The natural topography of Bangalore region is made up of a system of ridges and valleys. To conserve rain water, a lake system has developed in these valleys which continue to exist till date even though encroachment has taken place in many parts. These existing lakes are a prominent feature in the city fabric as the urban growth is quite often related to them. A large number of lakes have been converted into other uses, many a time adding to drainage and other environmental problems of the city.

- **Pre-Colonial Period:** The city of Bangalore enjoys a salubrious temperate climate conducive to horticulture and plantations. This is clearly evident from its initial years of development. Lal-bagh (Red garden) was conceived as a leisure garden during the period of Hyder-Ali and Tipu Sultan, during the second half of the 18th century. Lal-bagh later went on to become a renowned botanical garden by contributions during the colonial period and later by eminent horticulturists. The trends of development of horticultural gardens can be noticed all around the settlement during the various periods of history.

- **Colonial Period:** The Golf course, Race course and Cubbon Park formed a buffer between the British Cantonment and the Pette, the old city owing to its existence and development entirely to Indian rulers and administrations. The Palace Ground to the north of Cantonment and Lal-bagh to the south of Pette along with Ulsoor lake, Sankey tank and Yediur lake were on the fringes of the city, as it existed during early years of the 20th century. Cubbon Park was designed as a Joggers Paradise during the Colonial period, and continues to occupy a central position in the city structure. Several other small and large parks and tot-lots have been created in the subsequent planned developments.
which have come up around the historic core. Some of the parks which were created immediately after independence have also been declared as Heritage Parks. The largest maidan in the city includes a palace and hence called Palace Grounds.

- **Post-Independence Period:** With increase in population and demand for housing, a number of residential extensions was created along with the rise of industries around Bangalore. To restrict the growth of Bangalore a large green belt was conceived in the ODP 1972.

Playgrounds have been designed and created by BMP and many of them are found associated with educational institutions. A number of large Stadia are present in the core area and some of them are built over previous lake beds. With the rise of the IT Industry and construction boom and expansion at the turn of the 21st century, a number of regional parks have been proposed along district parks and playgrounds. Clumps of forest and quarries are scattered on the fringes of the city. The Bannerghatta National Reserve, a wild life sanctuary on the south is a huge tourist attraction.

### 3.8.1 Parks, Open Spaces and Green Areas

An open space plan is prepared by locating and analyzing broad patterns of vegetation and land uses in a landscape. The connectivity and functions of these areas are also considered in the open space plan. This forms the basis for planning open spaces. Landscape connections and planning are thus fundamental; open space planning incorporates ecological perspectives. Open space also includes environmental corridors and large parks within urban constellations. Open spaces are areas that play an active part in air and water quality.
improvement (Lewis, 1996). Bangalore City in South India is comparatively better placed in the overall Indian context and experience of urban environmental management (see Plate 3.9). Increasing population and industrialization in Bangalore in the latter half of the last century spawned waves of haphazard urbanization. This exacerbated many environmental and social problems leading to high costs and increasing difficulties in taking remedial measures. In general, parks, open spaces and green areas have been relatively neglected, underemphasized and inadequate. Streets are not wide enough to permit green walkways or linear parks links. A city of the size of Bangalore needs, according to consensual spatial and design standards of land use planning, at least 12 to 15 per cent of the developed area in the form of open spaces. It is, therefore, necessary to strictly prevent further encroachment on open spaces. All residential, commercial and industrial layouts should earmark 12 to 15 per cent of developed area for parks, playgrounds and other open space. Urban growth and urban development are not integrative and coordinating in nature and thus are creating slums, shortage of urban housing, intense squatting, inadequate urban services, disparities and discontent in urban life. This has deteriorated the living environment in the cities. Thus most important aspect of urban land use policy should be based on ecological considerations. One of the adverse effects of the rapid and random growth of the so-called ‘Garden City’ is the heavy encroachment on gardens, parks, playgrounds and other organized open spaces and tanks (water reservoirs). This has resulted in a problem in terms of shrinking open space and green areas. It would be good to prohibit conversion of craggy land into housing conglomerates and instead set it apart only for afforestation.

The CDP has been prepared as per the Karnataka Town and Country Planning Act in 1984 for the period of 15 years i.e., up to 2001 AD for 7 million population. LPA was extended from 500 to 1,279 sq. kms of conurbation area. Green belt area covered 682 sq. kms. which is beyond the conurbation limits. This Proposal of the CDP (revised) 1994 has been briefly mentioned while detailing about the study area.

Apart from the two major parks viz. Cubbon and Lalbagh Parks, the Bangalore Palace is proposed as a major city level park (See Plate3.10). While selecting these regional parks, the factors considered are the natural valleys, the tank areas, areas which are suitable for non-agricultural developments and nearness to the different parts of the city. To improve the climate of Bangalore, it is necessary that all the major parks and regional parks
proposed are developed with large scale tree planting and recreational facilities. BDA is also enforcing parks and open spaces in the private layouts. BDA schemes are being revised to provide for more parks and open spaces. The Golf Course taken up by the KSTDC nearer to the Bangalore Airport has been incorporated. The smaller open spaces earmarked in the CDP have been taken out and are proposed to be developed as ecological segments. The tank beds are proposed for preservations as per Laxman Rao Committee’s recommendations.

Seven Regional Parks such as Hoskerehalli Regional Park, Hebbal Regional Park, Mattikere Regional Park, Madivala Regional Park, Doddenakunddi Regional Park, Karenapalya Regional Park and Hossahalli Kere Regional Park present within the inner periphery of the third ring of BMA which are interspersed with larger lakes and valleys are major recreational areas. These regional parks are at the top in the hierarchy of parks with respect to size and importance. Land for Regional Park was allocated in the 1995 CDP, but they are yet to be developed and thrown open to public.

Next in the hierarchy are Theme/Heritage parks like Lal-bagh and Cubbon Park which by size and historic importance are on the tourist circuit. There are many neighborhood parks which are evenly distributed around the city and designed and maintained well by the horticulture department of BMP as well as other agencies.

Large Maidans act as multi-functional open spaces and in BMA the Palace Grounds happen to be the largest. There are several medium and smaller maidans spread around the city used for public gatherings and exhibitions. Stadia also sometimes cater to exhibitions besides games. There is a dearth of hygienically maintained swimming pools in the city. The Burial ground and Dhoebhi ghats occupy large prime areas of the city and they belong to certain sections of society. Hesarghatta, Thippagondanahalli, Vrishbavathi, Hebbal and Belandur lake system form the larger group in the periphery of BMA. The Ulsoor, Sankey, Yediyur and Madivala tanks are nearer the city center.
The single largest Green area around BMA is the Green belt comprising of the Agricultural land, protected forests and valleys. Vast Green areas are found in the Unclassified Defense land, Public, Semi-public, Residential and Industrial areas. The city has a number of beautiful boulevards the largest being The Laxman Rao Boulevard beginning at South End Circle Jayanagar upto JP Nagar. Several other boulevards like the one’s in Indiranagar, Vijayanagar and other prominent areas of the city, reaffirm the statement that Bangalore is a city of Gardens.

One of the most disastrous decisions taken by the authorities is to breach several existing water reservoirs, to prevent mosquito breeding. This has resulted in a change of microclimate and use of dry tank beds for other uses (see Table 3.3). It is necessary not only to stop the breaching of tanks but also to restore the breached tanks, wherever possible by clearing and freeing the catchment areas and waterways.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Urban Structure</th>
<th>Former Lake / Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Football Stadium</td>
<td>Shoolay lake</td>
</tr>
<tr>
<td>2</td>
<td>Hockey Stadium</td>
<td>Akkithimmanahalli lake</td>
</tr>
<tr>
<td>3</td>
<td>Sports Stadium</td>
<td>Samangi lake</td>
</tr>
<tr>
<td>4</td>
<td>City Bus Stand</td>
<td>Dhararmambudi lake</td>
</tr>
<tr>
<td>5</td>
<td>K. G. A Golf Course</td>
<td>Challagatta lake</td>
</tr>
<tr>
<td>6</td>
<td>Residential Layout and Sports Complex</td>
<td>Koramangala lake</td>
</tr>
<tr>
<td>7</td>
<td>Space Department</td>
<td>Nagasettyhalli lake</td>
</tr>
<tr>
<td>8</td>
<td>BDA Layout</td>
<td>Kadugondanahalli lake</td>
</tr>
<tr>
<td>9</td>
<td>Residential Layout</td>
<td>Domlur lake</td>
</tr>
<tr>
<td>10</td>
<td>Residential Layout</td>
<td>Millers lake</td>
</tr>
<tr>
<td>11</td>
<td>Residential Layout</td>
<td>Subashnagar lake</td>
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<tr>
<td>12</td>
<td>Residential Layout</td>
<td>Kurubanahalli lake</td>
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<tr>
<td>13</td>
<td>Residential Layout</td>
<td>Kodihalli lake</td>
</tr>
<tr>
<td>14</td>
<td>Residential Layout</td>
<td>Sirivagilu lake</td>
</tr>
<tr>
<td>15</td>
<td>Residential Layout</td>
<td>Marenahalli lake</td>
</tr>
<tr>
<td>16</td>
<td>Playground/Bus Stand</td>
<td>Shivannahalli lake</td>
</tr>
</tbody>
</table>


There are 81 ‘live’ tanks in the Bangalore Conurbation area and 262 tanks are existing within the green belt area (Fig. 3.6). Existing tanks are not to be breached because they facilitate maintaining the ground water aquifer at a reasonable level. They have a beneficial effect on the environment and are used for recreational purposes (see Plate 3.11, 3.12, 3.13 & 3.14).
They are not to be polluted by discharging effluents and industrial wastes. Prevent silting of tanks by offshore development and large-scale tree planting and also removal of encroachments within the study area. Breached tank beds should not to be developed as house sites. Urban green belts are considered the lungs of the cities as they act as a sink for some of the harmful gases released by vehicles and industries operating in the city area. Whether sprawling over a large area or a small belt, these green belts are found in all cities and play a very important role.

Green Belt covers 682 sq. km of the LPA and is proposed with a view to provide better climatic conditions. Steps are necessary to be taken by all the departments and agencies.

**Fig. 3.6** Bangalore Metropolitan Area with Green Belt and its surrounding region: Existing Natural Lakes and Drainage Systems

Source: Lake Development Authority, Bangalore 2006 (Compiled by Author)
concerned to prevent encroachment of land in the Green Belt. Large scale tree planting, provision of recreational facilities and other public and semi-public uses be proposed in the Green Belt.

The aerial view of Bangalore is really impressive with large expanse of greenery. Bangalore is called Green City as a result of its large parks and open space in addition to avenue trees in most parts of the city. Parks, open space and green areas are as important as any of the other dominant land use of the city.